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EXAMINER
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ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
Office Action Summary	10/531,794	LINDSKOG ET AL.
	Examiner	**Art Unit**	
	Michael R. Neff	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 April 2005*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *14-26* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *14-16 and 19-26* is/are rejected.

7)☒ Claim(s) *17 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 April 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/18/2005*.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____ .

DETAILED ACTION

Specification

1.   This application does not contain an abstract of the disclosure as required by 37

CFR 1.72(b). An abstract on a separate sheet is required.

2.   The abstract of the disclosure is objected to because of the following minor

informality:

The abstract reads "payload data is are associated with a given pilot", the

underlined portioned needs to be corrected by the applicant to properly convey the

intention of the sentence. Correction is required. See MPEP § 608.01(b)

Claim Objections

3.   Claims 17 and 18 are objected to because of the following informalities:

Re Claims 17 and 18, the term n is indefinite.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. **Claims 14-16, 19, 21, 22, 24 and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Kim et al. (herein after Kim) (US Publication 2002/0172184 A1).**

Re Claim 14, Kim discloses a method of communicating consecutive frames of digital data, said method comprising the steps of:

mapping payload data into complex symbols (101-104; Paragraphs 0008-0009; Figure 2 and Paragraph 0054-0055);

interspersing appropriate pilot symbols (105, 106, 210, 211); and,

mapping symbols on respective sub-channels (107, 212, 213);

whereby the insertion of a given pilot configuration into the stream of payload data will give rise to a specific output signal being associated with a given PAPR value (219; Paragraphs 0021, 0057);

wherein the digital data comprises OFDM modulated signals comprising a first plurality of payload carrying sub-channels and a second plurality of pilot carrying sub channels (Figure 5-8; Paragraphs 0008-0010, 0042-0052 and further discussion of these embodiments);

wherein each individual frame of payload data to be transmitted over the payload channels is associated with a given unique pilot configuration chosen from a sub-set of predetermined pilot configurations, each pilot configuration forming a unique pattern of predetermined pilot symbols and transmitted (Figure 2, 209, 211, 210, 212-215; Paragraph 0056);

wherein, prior to the transmission of at least one given frame of payload data,

each pilot configuration of the sub-set is evaluated with regard to PAPR for the

associated frame of payload data, whereby the pilot configuration being associated with

the lowest PAPR value is chosen for transmission (219, 220, Paragraphs 0057-0058).

Re Claim 16, Kim discloses the method according to claim 14, wherein a control

word indicative of the pilot configuration associated with a subsequent frame or a

particular frame of a subsequent given order number is inserted into the frame and

coded on a predetermined payload channel (210-217; Paragraph 0008-0010, 0021,

0054-0056).

Re Claim 21, Kim discloses the method according to claim 14, wherein the sub-

channels are modulated by BPSK or n-QAM modulation (Paragraph 0009).

Re Claim 22, Kim discloses a transmitter comprising:

a mapping stage (212-215),

mapping payload data on a subset of a plurality of frequency orthogonal sub-

carriers (Paragraph 0054-0058);

a plurality of parallel-coupled pilot insertion stages coupled to the mapping stage

(210 and 211),

each pilot insertion stage inserting a unique pilot configuration on at least another

subset of sub-carriers (210-211, paragraph 0057);

a respective inverse fast Fourier transmission stage processing signals from each respective pilot insertion stage (218);

a PAPR measuring and pilot decision stage (219, 220),

measuring and evaluating PAPR for each unique pilot configuration (219);

wherein, each individual frame of payload data to be transmitted over the payload channels is associated with a given unique pilot configuration chosen from a sub-set of predetermined pilot configurations, each pilot configuration forming a unique pattern of predetermined pilot symbols, and transmitted (Figure 2, 209, 211, 210, 212-215; Paragraph 0056); and,

wherein, prior to the transmission of at least one given frame of payload data, each pilot configuration of the sub-set is evaluated with regard to PAPR for the associated frame of payload data, whereby the pilot configuration associated with the lowest PAPR value is chosen for transmission (219, 220; Paragraphs 0057-0058)

Re Claim 24, Kim discloses the transmitter according to claim 22, further comprising a control word insertion stage for inserting a control word in a transmitted frame, the control word being indicative of the pilot configuration used in a frame of any given subsequent order number. (210-217; Paragraph 0008-0010, 0021, 0054-0056).

Re Claim 25, Kim discloses a receiver comprising:

a fast Fourier transform stage for transforming baseband signals into frequency signals relating to individual sub-channels (Figure 16, 1613); and,

a demodulation stage for performing individual demodulation, such as n-QAM, of

the frequency signals into bit estimates (1647) ;

wherein the receiver further comprises a pilot extraction stage for extracting block

coded pilot signals into assumed pilot configurations (1617);

wherein the assumed pilot configuration is provided to a frequency estimator for

adjusting the fast Fourier transform stage and to a channel estimator for adjusting the

demodulating stage (1645, output from 1613, 1615 and 1643; paragraph 0106-0108;

the pilot extractor data is used to provide the descrambling sequence, providing the

appropriate adjustments to the outputs of the FFT and channel estimator outputs to

allow for the data to be acquired).

Claim Rejections - 35 USC § 103

6.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7.   The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.
4.   Considering objective evidence present in the application indicating obviousness or nonobviousness.

8.   **Claims 19 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim.**

Re Claim 19, Kim discloses the method according to claim 14, but fails to explicitly disclose wherein, the sub-carriers carrying the pilot signals are digitally modulated at a lower order (BPSK) than sub-carriers carrying the payload data (QAM).

However Kim does disclose the knowledge to use both modulation forms (BPSK and QAM) within the disclosed communication system. The Examiner reads this as disclosing the ability to apply the different modulation schemes to the various aspects of the transmitted signal, provided that the appropriate demodulation methods are prepared (Paragraph 0009 and 0057).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the modulation techniques disclosed by Kim in a manner that allows for aspects of the transmission signal to be modulated in different modulation schemes in order to gain the benefit of utilizing the most efficient bit to symbol ratio for the system.

Re Claim 26, Kim discloses a receiver comprising:

a fast Fourier transform stage for transforming baseband signals into frequency signals relating to individual sub-channels (Figure 16, 1613); and,

a demodulation stage for performing individual demodulation, such as n-QAM, of the frequency signals into bit estimates (1647) ;

wherein the assumed pilot configuration is provided to a frequency estimator for adjusting the fast Fourier transform stage and to a channel estimator for adjusting the demodulating stage (1645, output from 1613, 1615 and 1643; paragraph 0106-0108; the pilot extractor data is used to provide the descrambling sequence, providing the appropriate adjustments to the outputs of the FFT and channel estimator outputs to allow for the data to be acquired), however Kim fails to explicitly disclose wherein the receiver further comprises a pilot extraction stage for extracting block coded pilot signals into assumed pilot configurations (1617).

Although Kim does not explicitly show a "control word" extractor, the Examiner notes that figure 16 discloses a receiver system operable to function in an inverse fashion to the disclosed transmitter and manipulate the associated data accordingly to retrieve the transmitted data signal. The pilot code extracted/assumed by the receiver is the minimum PAPR pilot code, the value of which is used to determine the scrambling code values, which function as the control signals (control word), for each parallel channel.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made that the disclosure of Kim provides for a receiver system wherein the pilot and control signals a collectively extracted and then beneficially used to perform final manipulations to the signals in order to retrieve the original transmitted data signals with minimal signal/bit error in the decoding process.

9.   **Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim in view of Stevenson (US Patent 6,209,112 B1).**

Re Claim 15, Kim discloses the method according to claim 14, Kim further discloses the use of Reed-Solomon encoding which is a well known method of block coding for the purpose of error correction to one of ordinary skill in the art, however Kim fails to explicitly disclose wherein the plurality of pilot configurations represent block codes allowing error correction at the receiver.

This method is however disclosed by Stevenson. Stevenson discloses a communication system wherein the pilot configurations represent block codes allowing error correction at the receiver (Col. 4 lines 8-21).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the use of block coding for assistance in the process of error correction as disclosed by Stevenson with the communication method disclosed by Kim in order to gain the benefit of a reduced number of signal errors in the receiver.

10.   **Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim in view of Khandani et al. (herein after Khandani) (US Publication 2004/0093545 A1).**

Re Claim 23, Kim discloses the transmitter according to claim 22, but fails to explicitly disclose wherein each unique pilot configuration has a hamming distance of at least three to any other pilot configuration.

This design is however disclosed by Khandani. Khandani discloses a PAPR based system wherein the block codes transmit with a hamming code value of 3 (Paragraph 0189).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, given that the desire to have a large hamming distance to increase the amount of error correction possible for a signal, to incorporate the disclosure of Khandani with that of Kim to gain the benefit of designing the coding to function at high rate of efficiency within a system that focuses on the signal PAPR.

11.   **Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim and Stevenson as applied to claim 15 above and further in view of Khandani.**

Re Claim 20, Kim discloses the method according to claim 15, but fails to explicitly disclose wherein each unique pilot configuration has a hamming distance of at least three to any other pilot configuration.

This design is however disclosed by Khandani. Khandani discloses a PAPR based system wherein the block codes transmit with a hamming code value of 3 (Paragraph 0189).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, given that the desire to have a large hamming distance to increase the amount of error correction possible for a signal, to incorporate the disclosure of Khandani with that of Kim to gain the benefit of designing the coding to function at high rate of efficiency within a system that focuses on the signal PAPR.

Allowable Subject Matter

12.   Claims 17 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13.   The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record does fails to anticipate or render obvious the limitations wherein out of n frame periods, n-1 are optimized while one is not optimized with regards to the PAPR.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael R. Neff whose telephone number is (571) 270-1848. The examiner can normally be reached on Monday - Friday 8:00am - 4:30pm EST ALT Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on (571)272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

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Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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